

# Assignment Sheet / Density Test

Project Number : 23502-ZS9  
Project Name : HSR  
Date Drilled : 8/30/13

Lab. Tech : K. Ford  
Date Completed : 9/17/13

[illegible]





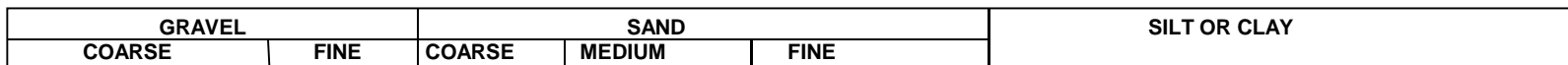
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## Sieve Analysis for Soil / Fine Aggregate ASTM C-136

Project:	CA HSR	Technician:	K. Ford
		Date:	9/16/2013
TES#:	23502-ZS9	Sample No.:	SS02-1
Boring #:	S0019AR; 10.5-11.5'	Classification:	(ML) Sandy Silt

	Weight (lbs. or grams)	Maximum Sieve Size	Minimum Weight of Test Specimen, lbs. (kg)
Total Dry Sample + Tare Wt.		Sand	1.0 (0.5)
Tare Weight		3/8"	2.0 (1.0)
Total Dry Sample Wt.	142.9	1/2"	4.0 (2.0)
Initial Weight Fine		3/4"	11.0 (5.0)
Aggregate Before Wash	142.9	1"	22.0 (10.0)
Final Weight Fine		1 1/2"	33.0 (15.0)
Aggregate After Wash	66.9	2"	44.0 (20.0)

Sieve Size	Cumulative Weight Retained	Individual Weights Retained	Cumulative % Retained	Cumulative % Passing	Specs.
3 in.			0.0	100.0	
2 1/2 in.			0.0	100.0	
2 in.			0.0	100.0	
1 1/2 in.			0.0	100.0	
1 in.			0.0	100.0	
3/4 in.			0.0	100.0	
1/2 in.			0.0	100.0	
3/8 in.			0.0	100.0	
#4	0.0	0.0	0.0	100.0	
#8	0.0	0.0	0.0	100.0	
#16	0.0	0.0	0.0	100.0	
#30	0.3	0.3	0.2	99.8	
#50	3.4	3.1	2.4	97.6	
#100	18.3	14.9	12.8	87.2	
#200	58.0	39.7	40.6	59.4	
Pan	66.9				



—■— SS02-1

[illegible]



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## Sieve Analysis for Soil / Fine Aggregate ASTM C-136

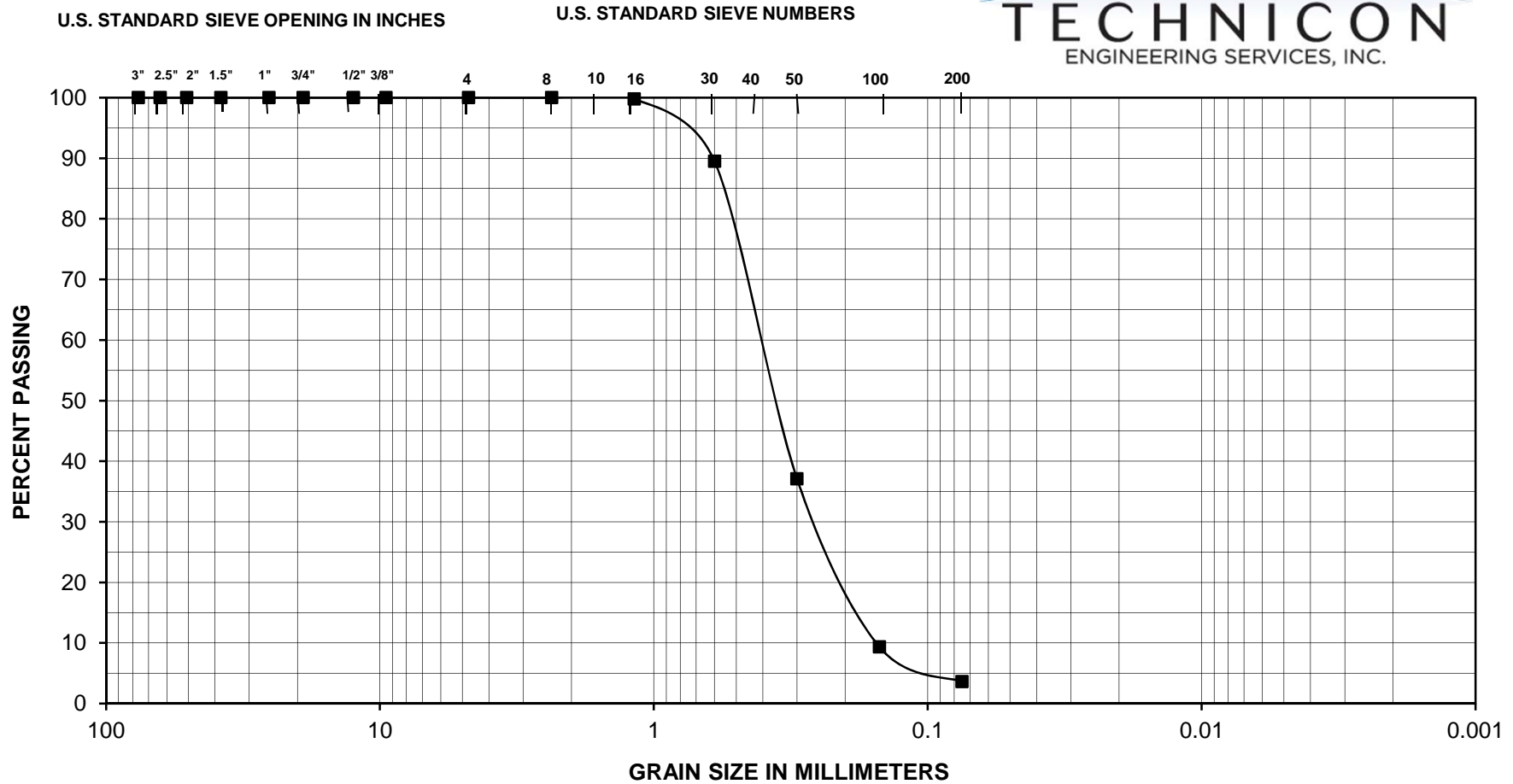
Project:	CA HSR	Technician:	K. Ford
		Date:	1/16/2014
TES#:	23502-ZS9	Sample No.:	MC03-2
Boring #:	S0019AR; 15.5-16'	Classification:	(SP) Poorly Graded Sand

	Weight (lbs. or grams)	Maximum Sieve Size	Minimum Weight of Test Specimen, lbs. (kg)
Total Dry Sample + Tare Wt.		Sand	1.0 (0.5)
Tare Weight		3/8"	2.0 (1.0)
Total Dry Sample Wt.	174.1	1/2"	4.0 (2.0)
Initial Weight Fine		3/4"	11.0 (5.0)
Aggregate Before Wash	174.1	1"	22.0 (10.0)
Final Weight Fine		1 1/2"	33.0 (15.0)
Aggregate After Wash	151.4	2"	44.0 (20.0)

Sieve Size	Cumulative Weight Retained	Individual Weights Retained	Cumulative % Retained	Cumulative % Passing	Specs.
3 in.			0.0	100.0	
2 1/2 in.			0.0	100.0	
2 in.			0.0	100.0	
1 1/2 in.			0.0	100.0	
1 in.			0.0	100.0	
3/4 in.			0.0	100.0	
1/2 in.			0.0	100.0	
3/8 in.			0.0	100.0	
#4	0.0	0.0	0.0	100.0	
#8	0.0	0.0	0.0	100.0	
#16	0.4	0.4	0.2	99.8	
#30	18.3	17.9	10.5	89.5	
#50	109.5	91.2	62.9	37.1	
#100	157.8	48.3	90.6	9.4	
#200	167.8	10.0	96.4	3.6	
Pan	151.4				



GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

—■— MC03-2

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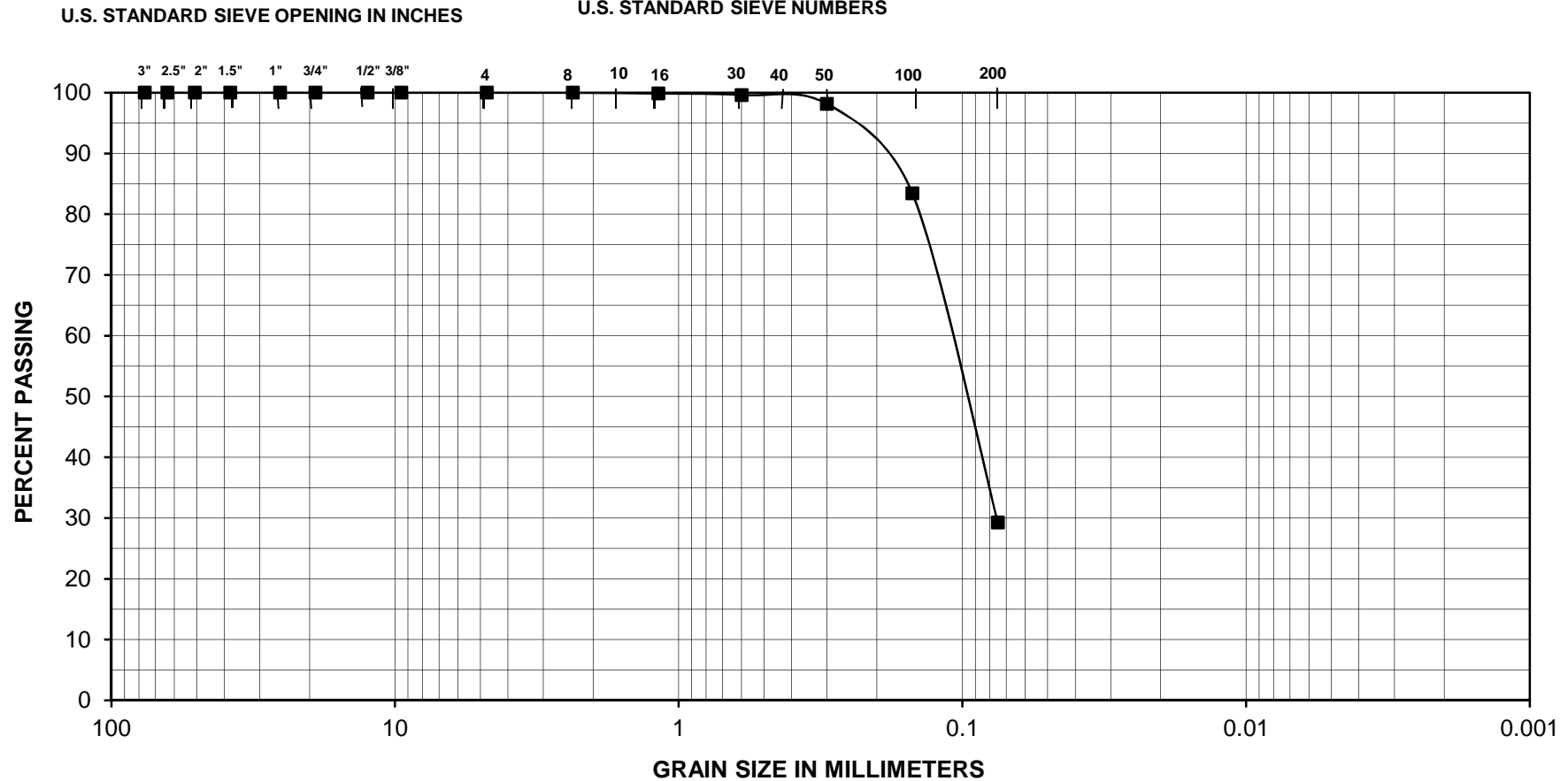
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## Sieve Analysis for Soil / Fine Aggregate ASTM C-136

Project:	CA HSR	Technician:	K. Ford
		Date:	9/16/2013
TES#:	23502-ZS9	Sample No.:	MC05-1
Boring #:	S0019AR; 26.0-26.5'	Classification:	(SM) Silty Sand

	Weight (lbs. or grams)	Maximum Sieve Size	Minimum Weight of Test Specimen, lbs. (kg)
Total Dry Sample + Tare Wt.		Sand	1.0 (0.5)
Tare Weight		3/8"	2.0 (1.0)
Total Dry Sample Wt.	75.5	1/2"	4.0 (2.0)
Initial Weight Fine		3/4"	11.0 (5.0)
Aggregate Before Wash	75.5	1"	22.0 (10.0)
Final Weight Fine		1 1/2"	33.0 (15.0)
Aggregate After Wash	62.7	2"	44.0 (20.0)

Sieve Size	Cumulative Weight Retained	Individual Weights Retained	Cumulative % Retained	Cumulative % Passing	Specs.
3 in.			0.0	100.0	
2 1/2 in.			0.0	100.0	
2 in.			0.0	100.0	
1 1/2 in.			0.0	100.0	
1 in.			0.0	100.0	
3/4 in.			0.0	100.0	
1/2 in.			0.0	100.0	
3/8 in.			0.0	100.0	
#4	0.0	0.0	0.0	100.0	
#8	0.0	0.0	0.0	100.0	
#16	0.1	0.1	0.1	99.9	
#30	0.3	0.2	0.4	99.6	
#50	1.4	1.1	1.9	98.1	
#100	12.5	11.1	16.6	83.4	
#200	53.4	40.9	70.7	29.3	
Pan	62.6				



GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

—■— MC05-1

[illegible]



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## Sieve Analysis for Soil / Fine Aggregate ASTM C-136

Project:	CA HSR	Technician:	K. Ford
TES#:	23502-ZS9	Date:	1/14/2014
Boring #:	S0019AR; 30-31.5'	Sample No.:	SS06
		Classification:	(SM/SP) Poorly Graded Sand

	Weight (lbs. or grams)	Maximum Sieve Size	Minimum Weight of Test Specimen, lbs. (kg)
Total Dry Sample + Tare Wt.		Sand	1.0 (0.5)
Tare Weight		3/8"	2.0 (1.0)
Total Dry Sample Wt.	181.5	1/2"	4.0 (2.0)
Initial Weight Fine		3/4"	11.0 (5.0)
Aggregate Before Wash	181.5	1"	22.0 (10.0)
Final Weight Fine		1 1/2"	33.0 (15.0)
Aggregate After Wash	169.1	2"	44.0 (20.0)

Sieve Size	Cumulative Weight Retained	Individual Weights Retained	Cumulative % Retained	Cumulative % Passing	Specs.
3 in.			0.0	100.0	
2 1/2 in.			0.0	100.0	
2 in.			0.0	100.0	
1 1/2 in.			0.0	100.0	
1 in.			0.0	100.0	
3/4 in.			0.0	100.0	
1/2 in.			0.0	100.0	
3/8 in.			0.0	100.0	
#4	0.0	0.0	0.0	100.0	
#8	0.0	0.0	0.0	100.0	
#16	0.4	0.4	0.2	99.8	
#30	18.3	17.9	10.1	89.9	
#50	109.5	91.2	60.3	39.7	
#100	157.8	48.3	86.9	13.1	
#200	167.8	10.0	92.5	7.5	
Pan	169.1				



—■— SS06

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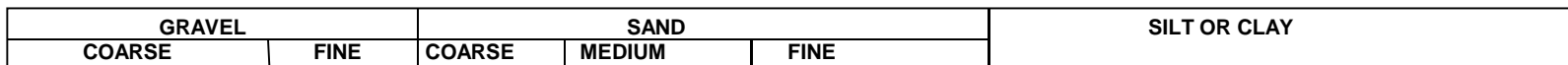
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## Sieve Analysis for Soil / Fine Aggregate ASTM C-136

Project:	CA HSR	Technician:	K. Ford
		Date:	9/16/2013
TES#:	23502-ZS9	Sample No.:	MC07-1
Boring #:	S0019AR; 36.0-36.5'	Classification:	(SM) Silty Sand

	Weight (lbs. or grams)	Maximum Sieve Size	Minimum Weight of Test Specimen, lbs. (kg)
Total Dry Sample + Tare Wt.		Sand	1.0 (0.5)
Tare Weight		3/8"	2.0 (1.0)
Total Dry Sample Wt.	156.3	1/2"	4.0 (2.0)
Initial Weight Fine		3/4"	11.0 (5.0)
Aggregate Before Wash	156.3	1"	22.0 (10.0)
Final Weight Fine		1 1/2"	33.0 (15.0)
Aggregate After Wash	105.4	2"	44.0 (20.0)

Sieve Size	Cumulative Weight Retained	Individual Weights Retained	Cumulative % Retained	Cumulative % Passing	Specs.
3 in.			0.0	100.0	
2 1/2 in.			0.0	100.0	
2 in.			0.0	100.0	
1 1/2 in.			0.0	100.0	
1 in.			0.0	100.0	
3/4 in.			0.0	100.0	
1/2 in.			0.0	100.0	
3/8 in.			0.0	100.0	
#4	0.0	0.0	0.0	100.0	
#8	0.0	0.0	0.0	100.0	
#16	0.2	0.2	0.1	99.9	
#30	4.3	4.1	2.8	97.2	
#50	13.2	8.9	8.4	91.6	
#100	43.6	30.4	27.9	72.1	
#200	95.1	51.5	60.8	39.2	
Pan	105.2				

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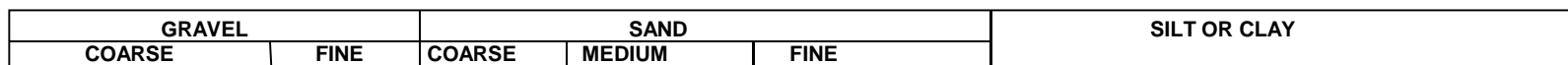
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## Sieve Analysis for Soil / Fine Aggregate ASTM C-136

Project: <u>CA HSR</u>	Technician: <u>K. Ford</u>
	Date: <u>9/16/2013</u>
TES#: <u>23502-ZS9</u>	Sample No.: <u>MC09-1</u>
Boring #: <u>S0019AR; 46.0-46.5'</u>	Classification: <u>(SP) Poorly Graded Sand</u>

	Weight (lbs. or grams)	Maximum Sieve Size	Minimum Weight of Test Specimen, lbs. (kg)
Total Dry Sample + Tare Wt.		Sand	1.0 (0.5)
Tare Weight		3/8"	2.0 (1.0)
Total Dry Sample Wt.	194.4	1/2"	4.0 (2.0)
Initial Weight Fine		3/4"	11.0 (5.0)
Aggregate Before Wash	194.4	1"	22.0 (10.0)
Final Weight Fine		1 1/2"	33.0 (15.0)
Aggregate After Wash	186.4	2"	44.0 (20.0)

Sieve Size	Cumulative Weight Retained	Individual Weights Retained	Cumulative % Retained	Cumulative % Passing	Specs.
3 in.			0.0	100.0	
2 1/2 in.			0.0	100.0	
2 in.			0.0	100.0	
1 1/2 in.			0.0	100.0	
1 in.			0.0	100.0	
3/4 in.			0.0	100.0	
1/2 in.			0.0	100.0	
3/8 in.			0.0	100.0	
#4	0.0	0.0	0.0	100.0	
#8	0.0	0.0	0.0	100.0	
#16	0.1	0.1	0.1	99.9	
#30	64.4	64.3	33.1	66.9	
#50	144.8	80.4	74.5	25.5	
#100	176.5	31.7	90.8	9.2	
#200	185.7	9.2	95.5	4.5	
Pan	186.3				

[illegible]



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## Sieve Analysis for Soil and Fine Aggregate

Project:	<b>HSR</b>	Technician:	<b>K. Ford</b>
TES#:	<b>23502-ZS9</b>	Date:	<b>9/13/2013</b>
Boring No.:	<b>S0019AR</b>	Sample No.:	<b>SS12</b>
		Remarks:	<b>(SM) Fine Silty Sand</b>

	Weight (grams)	Maximum Sieve Size	Minimum Weight of Test Specimen, lbs. (kg)
Total Dry Sample + Tare Wt.		Sand	1.0 (0.5)
Tare Weight		3/8"	2.0 (1.0)
Total Dry Sample Wt.	<b>98.2</b>	1/2"	4.0 (2.0)
Initial Weight Fine		3/4"	11.0 (5.0)
Soil Before Wash	98.2	1"	22.0 (10.0)
Final Weight Fine		1 1/2"	33.0 (15.0)
Soil After Wash	<b>77.6</b>	2"	44.0 (20.0)

Sieve Size	Individual Weight Retained	Individual % Retained	Combined % Retained	Combined % Passing	Specs.
3 in.	<b>0.0</b>	0.0	0.0	100.0	
2 1/2 in.	<b>0.0</b>	0.0	0.0	100.0	
2 in.	<b>0.0</b>	0.0	0.0	100.0	
1 1/2 in.	<b>0.0</b>	0.0	0.0	100.0	
1 in.	<b>0.0</b>	0.0	0.0	100.0	
3/4 in.	<b>0.0</b>	0.0	0.0	100.0	
1/2 in.	<b>0.0</b>	0.0	0.0	100.0	
3/8 in.	<b>0.0</b>	0.0	0.0	100.0	
#4	<b>0.0</b>	0.0	0.0	100.0	
#8	<b>0.0</b>	0.0	0.0	100.0	
#10	<b>0.0</b>	0.0	0.0	100.0	
#16	<b>0.2</b>	0.2	0.2	99.8	
#30	<b>2.5</b>	2.5	2.8	97.2	
#40	<b>12.1</b>	12.3	15.1	84.9	
#50	<b>13.0</b>	13.2	28.3	71.7	
#100	<b>27.8</b>	28.3	56.6	43.4	
#200	<b>19.6</b>	20.0	76.6	23.4	
Pan					

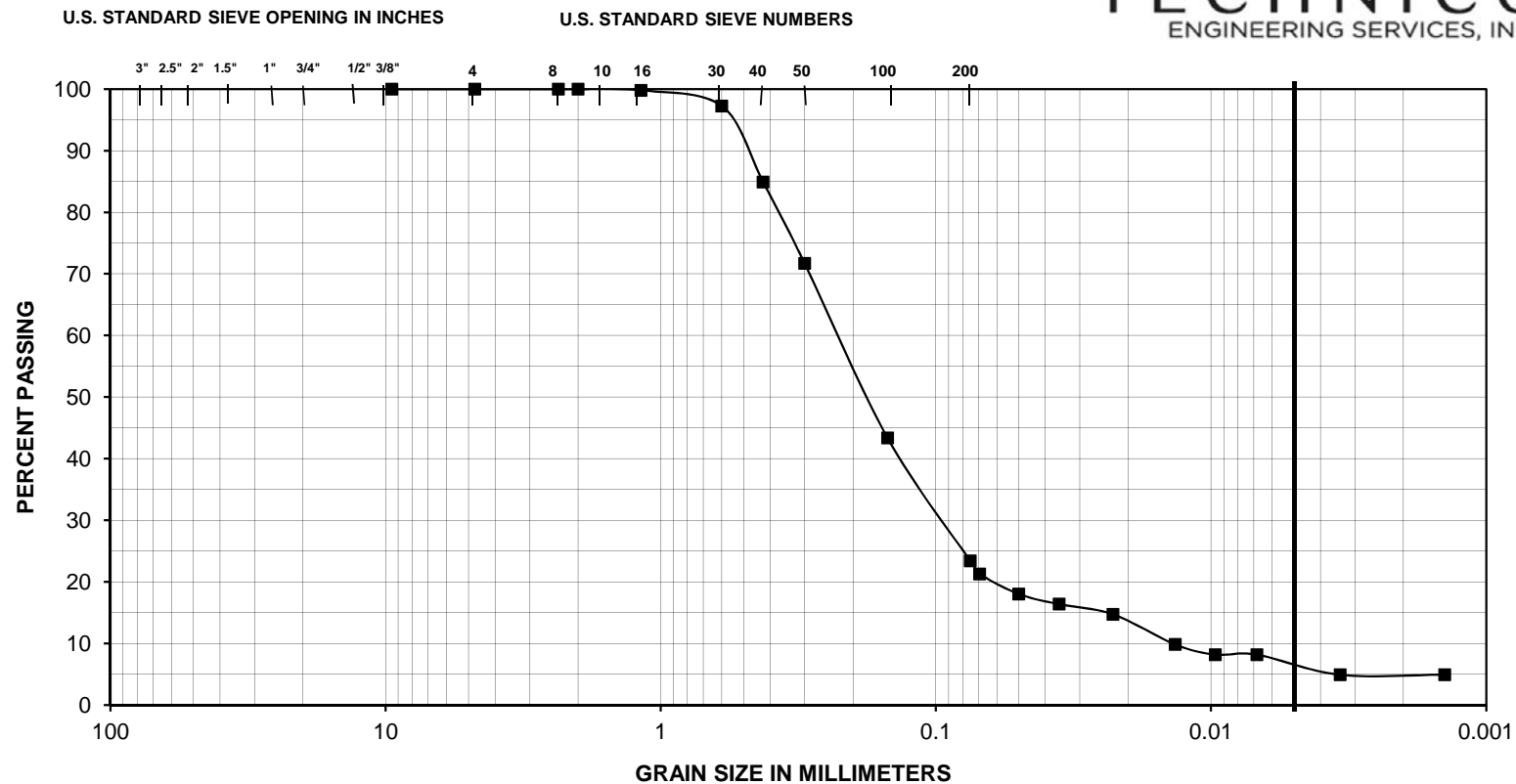


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## HYDROMETER TEST DATA SUMMARY

ASTM D 422-63

PROJECT:		HSR			TES #: 23502-ZS9		
Boring Number/ Sample ID		S0019AR SS12		TESTED BY: K. Ford		DATE: 9/13/2013	
Sample Depth, ft		61'-61.5'					
Mass of Test Sample, g		98.65	"air-dried"	Hydrometer Type		151H	
Mass of Hygroscopic Sample, g		23.23	"air-dried"				
Mass of Hygroscopic Sample, g		23.12	"oven-dried"	Specific Gravity of Test Material		2.650	
Mass of Test Sample, g		98.18	"oven-dried"	Specific Gravity of Test Solution		Varies	
Time (min.)	Hydrometer Reading	Corrected Reading	Temperature Degrees C	Effective Depth Table 2 (cm)	Constant, K Table 3	Diameter, D (mm)	Amt. Suspended, P (%)
0.5	1.015	1.013	21	12.9	0.01365	0.0693	21.3
1	1.013	1.011	21	13.4	0.01365	0.0500	18.0
2	1.012	1.010	21	13.7	0.01365	0.0357	16.4
5	1.011	1.009	21	13.9	0.01365	0.0228	14.7
15	1.008	1.006	21	14.7	0.01365	0.0135	9.8
30	1.007	1.005	21	15.0	0.01365	0.0097	8.2
60	1.007	1.005	21	15.0	0.01365	0.0068	8.2
250	1.005	1.003	21	15.5	0.01365	0.0034	4.9
1440	1.005	1.003	21	15.5	0.01365	0.0014	4.9
2880	1.005	1.003	21	15.5	0.01365	0.0010	4.9



Sample #	Classification	% Gravel	% Sand	% Silt	% Clay*	% Moist.	LL	PL	PI	Project:	HSR
SS12	(SM) Fine Silty Sand	0	76.6	15.8	7.6	0.5					
										TES#:	23502-ZS9
										Boring#:	S0019AR
										Date:	9/13/2013

\* Particles smaller than 5 Micron in diameter



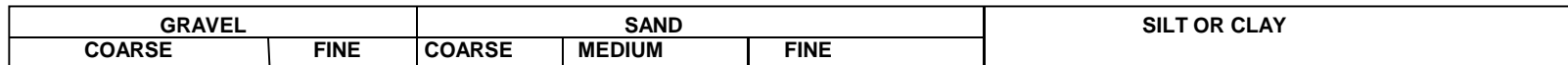
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## Sieve Analysis for Soil / Fine Aggregate ASTM C-136

Project:	CA HSR	Technician:	K. Ford
		Date:	9/16/2013
TES#:	23502-ZS9	Sample No.:	SS14-1
Boring #:	S0019AR; 71.0-71.5'	Classification:	(SP) Poorly Graded Sand

	Weight (lbs. or grams)	Maximum Sieve Size	Minimum Weight of Test Specimen, lbs. (kg)
Total Dry Sample + Tare Wt.		Sand	1.0 (0.5)
Tare Weight		3/8"	2.0 (1.0)
Total Dry Sample Wt.	126.0	1/2"	4.0 (2.0)
Initial Weight Fine		3/4"	11.0 (5.0)
Aggregate Before Wash	126.0	1"	22.0 (10.0)
Final Weight Fine		1 1/2"	33.0 (15.0)
Aggregate After Wash	110.9	2"	44.0 (20.0)

Sieve Size	Cumulative Weight Retained	Individual Weights Retained	Cumulative % Retained	Cumulative % Passing	Specs.
3 in.			0.0	100.0	
2 1/2 in.			0.0	100.0	
2 in.			0.0	100.0	
1 1/2 in.			0.0	100.0	
1 in.			0.0	100.0	
3/4 in.			0.0	100.0	
1/2 in.			0.0	100.0	
3/8 in.			0.0	100.0	
#4	0.0	0.0	0.0	100.0	
#8	0.1	0.1	0.1	99.9	
#16	0.3	0.2	0.2	99.8	
#30	20.0	19.7	15.9	84.1	
#50	82.1	62.1	65.2	34.8	
#100	100.6	18.5	79.8	20.2	
#200	110.1	9.5	87.4	12.6	
Pan	110.8				



—■— SS14-1

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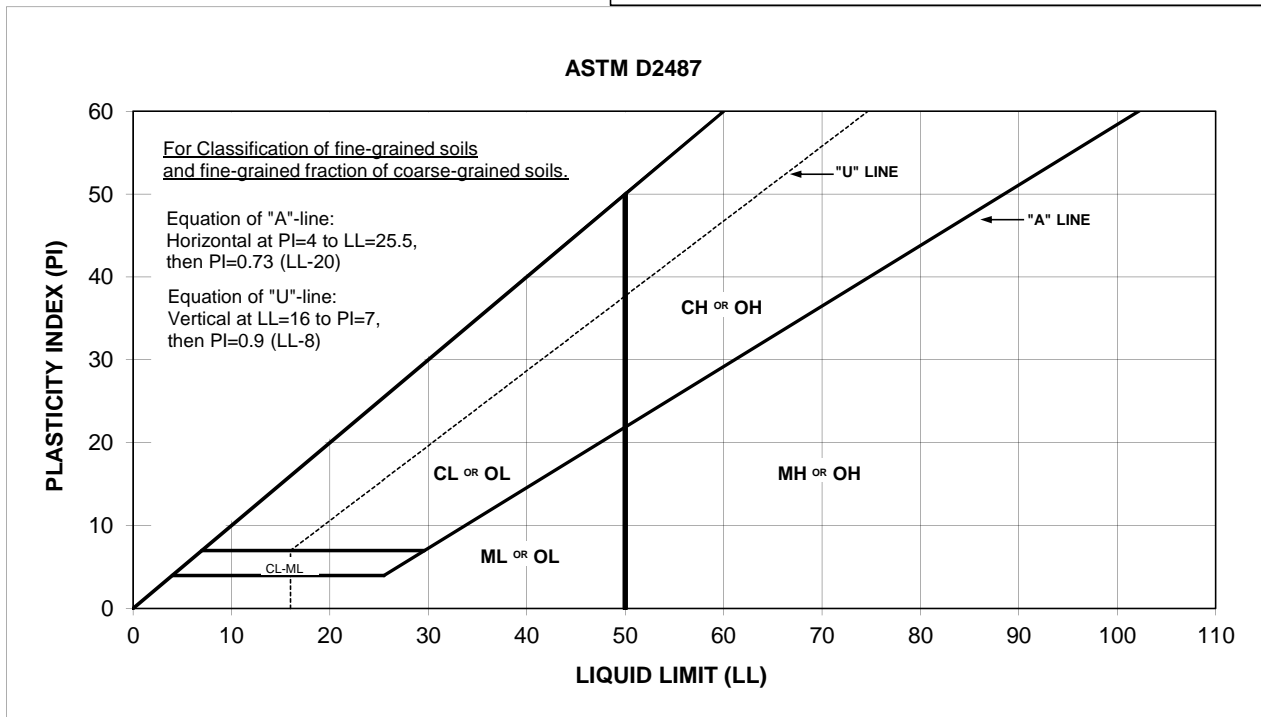
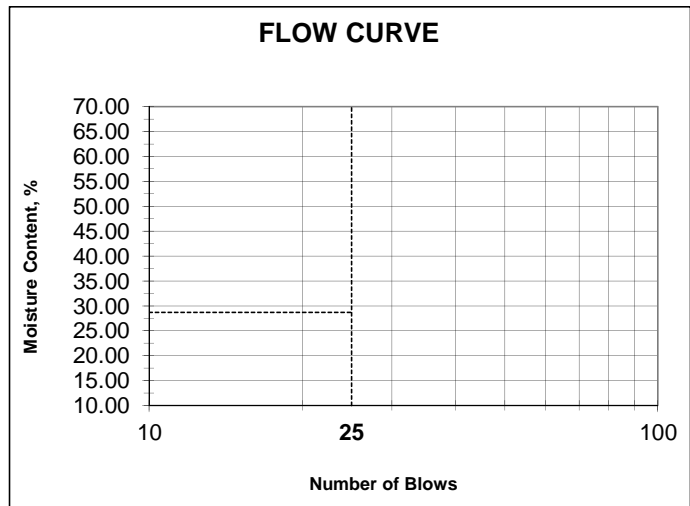
**Determination of Atterberg Limits**  
ASTM D 4318, CTM 204

Project Name:	HSR				Project No.:	23502-ZS9	
Soil Boring No:	S0019AR	Depth:	66.0'-66.5'	Date:	9/16/13	Tested By:	S. Alvarez
Sample No.:	MC13-1				Classification:	(SM) Silty Sand	

	PLASTIC LIMIT		
	1	2	3
A Tes No.			
B Tare No.			
C Mass of Pan + Dry Soil, g			
D Mass of Pan + Wet Soil, g			
E Mass of Pan, g			
F Mass of Water, g			
G Mass of Dry Soil, g			
H Moisture Content, %			
I Average Moisture Content, % (PL)			

	LIQUID LIMIT			
No. of Blows				

<b>Liquid Limit:</b> Read from graph	
<b>Plastic Limit:</b> Line I	
<b>Plasticity Index:</b> PI = LL - PL	<b>Nonplastic</b>





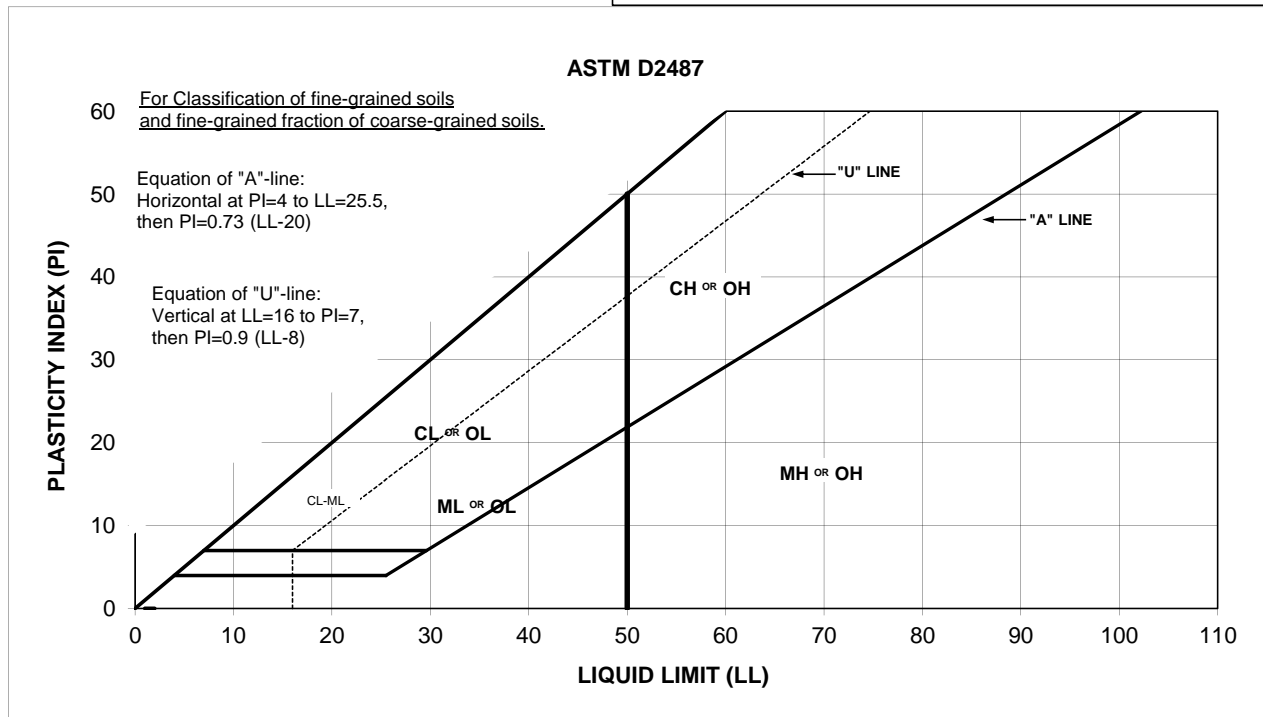
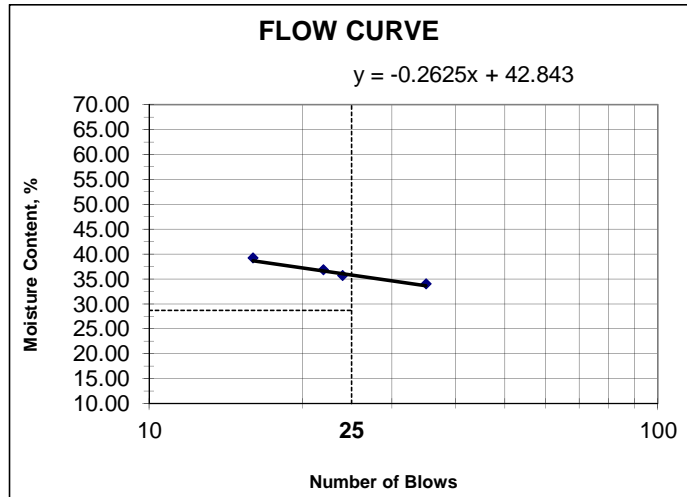
**Determination of Atterberg Limits**  
ASTM D 4318, CTM 204

Project Name:	HSR			Project No.:	23502-ZS9		
Soil Boring No:	S0019AR	Depth:	75.5'-76.0'	Date:	9/16/13	Tested By:	K. Ford
Sample No.:	MC15-2			Classification:	(ML) Sandy Silt		

	PLASTIC LIMIT		
	1	2	3
A Tes No.			
B Tare No.			
C Mass of Pan + Dry Soil, g	49.80	46.12	47.33
D Mass of Pan + Wet Soil, g	57.40	52.70	54.40
E Mass of Pan, g	28.10	28.07	27.99
F Mass of Water, g	7.60	6.58	7.07
G Mass of Dry Soil, g	21.70	18.05	19.34
H Moisture Content, %	35.02	36.45	36.56
I Average Moisture Content, % (PL)		36.01	

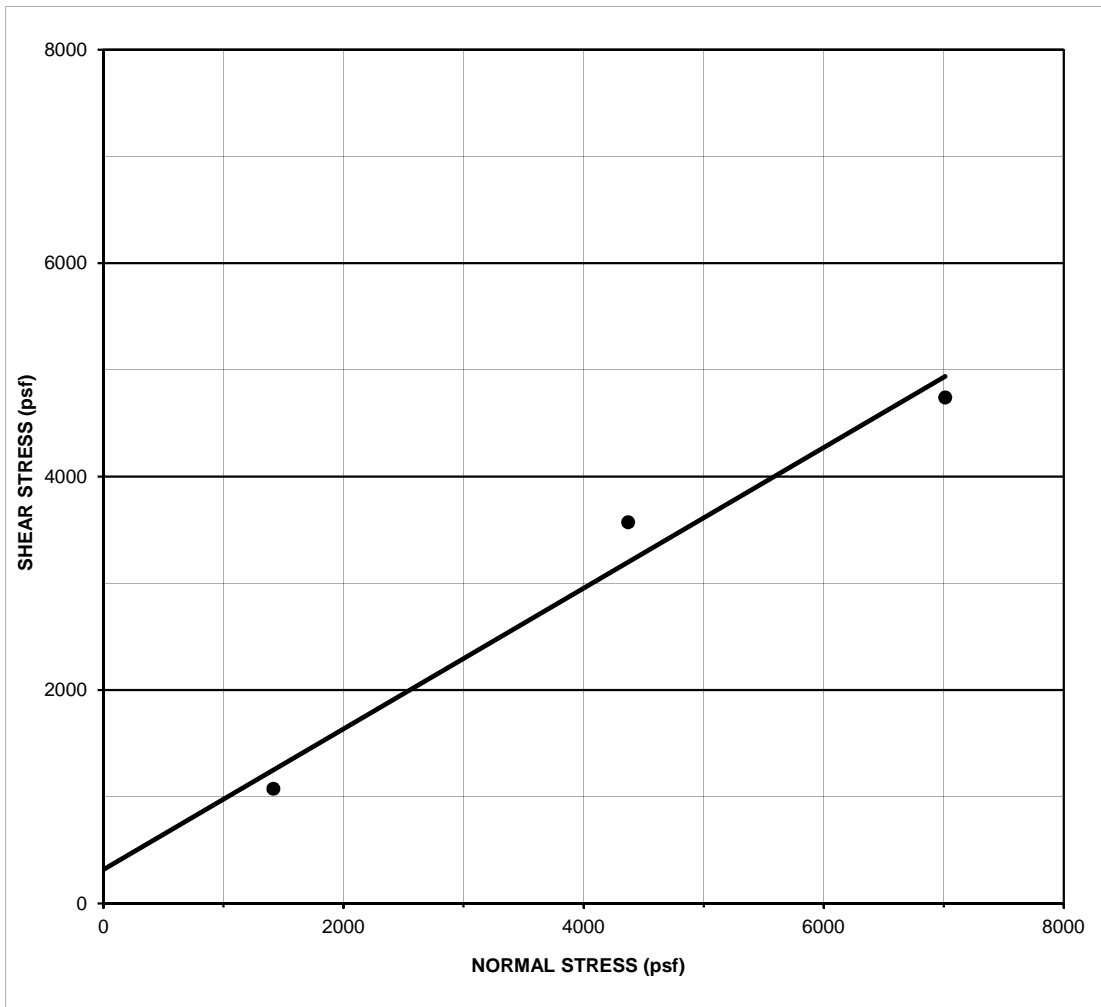
	LIQUID LIMIT			
No. of Blows	35	24	22	16
	33.61	33.63	33.77	29.61
	35.50	38.34	35.88	33.2
	28.06	20.45	28.05	20.46
	1.89	4.71	2.11	3.59
	5.55	13.18	5.72	9.15
	34.05	35.74	36.89	39.23

<b>Liquid Limit:</b> Read from graph	<b>NP</b>
<b>Plastic Limit:</b> Line I	<b>NP</b>
<b>Plasticity Index:</b> PI = LL - PL	<b>NP</b>





**Direct Shear Test**  
**ASTM D3080**



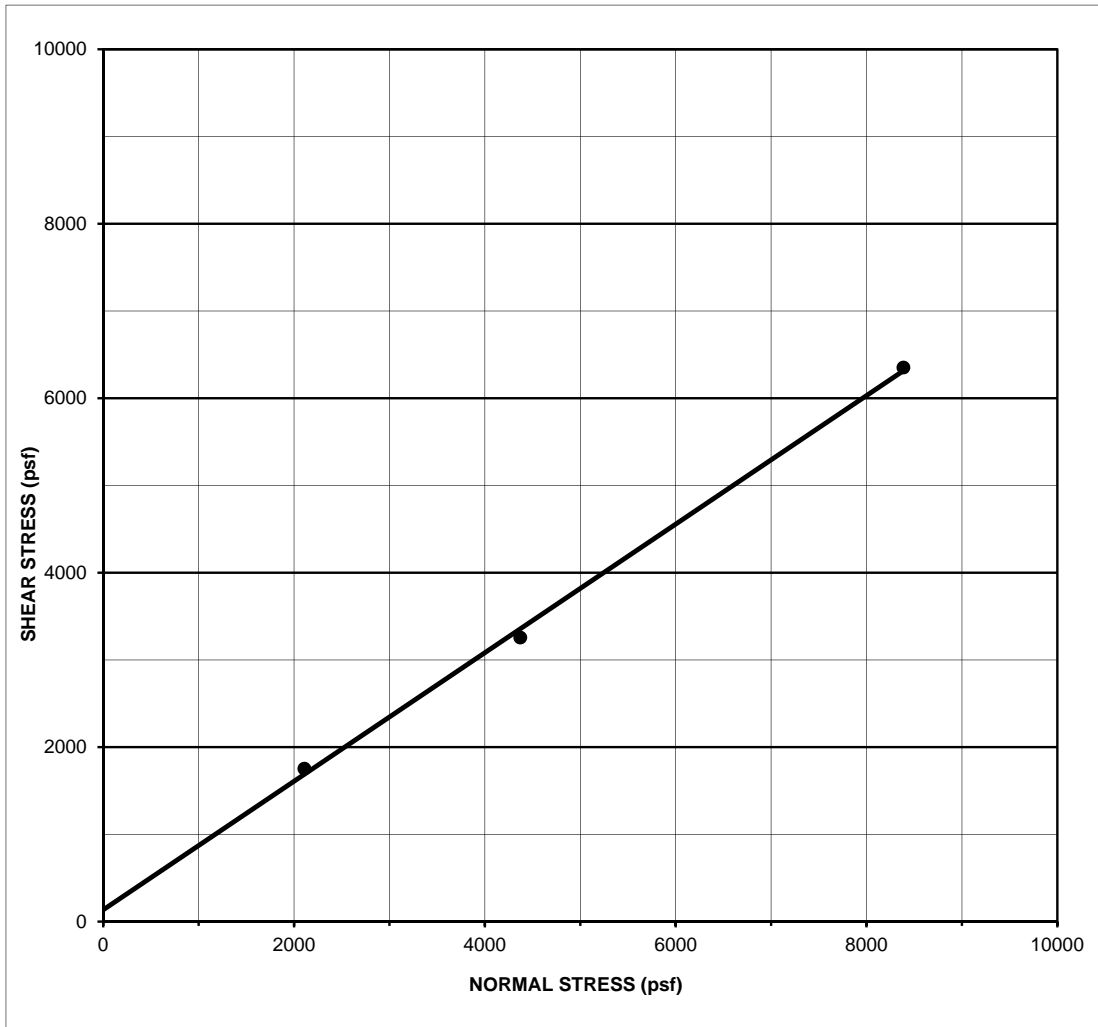
PROJECT:	HSR
TES NO.:	23502-ZS9
SAMPLE DATE.:	8/30/2013
BORING NO.:	S0019AR
SAMPLE NO.:	MC01-1 Depth(6.0'-6.5')
DESCRIPTION:	Silty Sand (SM)

Cohesive Pressure, psf	320
Internal Friction Angle	33

SPECIMEN	A	B	C	D	E
DRY DENSITY (pcf)	112.4	112.4	112.4	---	---
INITIAL WATER CONTENT (%)	7.2	7.2	7.2	---	---
FINAL WATER CONTENT (%)	16.9	15.8	16.8	---	---
NORMAL STRESS (psf)	1415	4371	7012	---	---
MAXIMUM SHEAR (psf)	1074	3572	4740	---	---



**Direct Shear Test  
ASTM D3080**



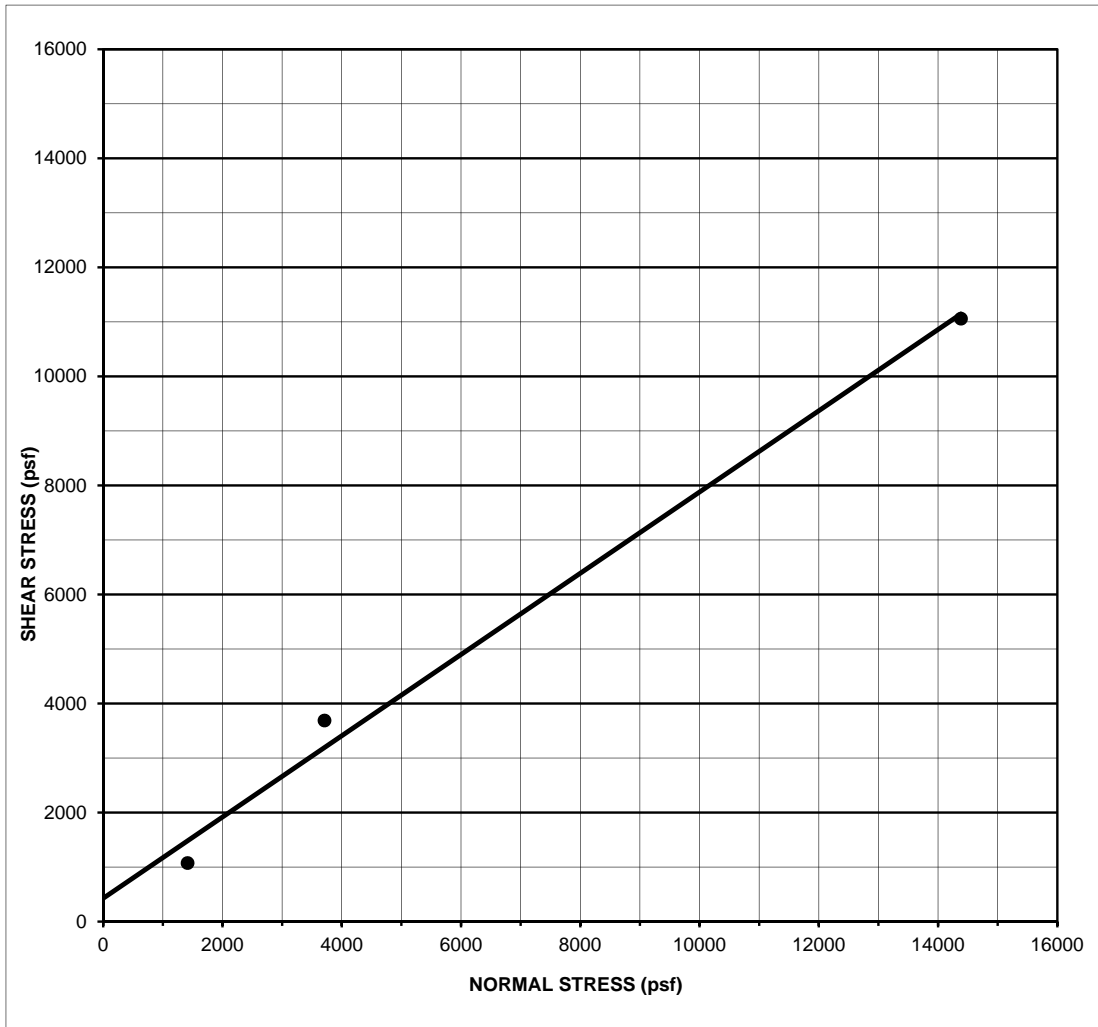
PROJECT:	HSR
TES NO.:	23502-ZS9
SAMPLE DATE.:	8/30/2013
BORING NO.:	S0019AR
SAMPLE NO.:	MC03-1 Depth(16.0'-16.5')
DESCRIPTION:	Silty Sand (SM)

Cohesive Pressure, psf	140
Internal Friction Angle $\phi$	36

SPECIMEN	A	B	C	D	E
DRY DENSITY (pcf)	112.4	112.4	112.4	---	---
INITIAL WATER CONTENT (%)	7.2	7.2	7.2	---	---
FINAL WATER CONTENT (%)	26.8	26.5	23.5	---	---
NORMAL STRESS (psf)	2108	4371	8387	---	---
MAXIMUM SHEAR (psf)	1753	3256	6352	---	---



**Direct Shear Test**  
**ASTM D3080**



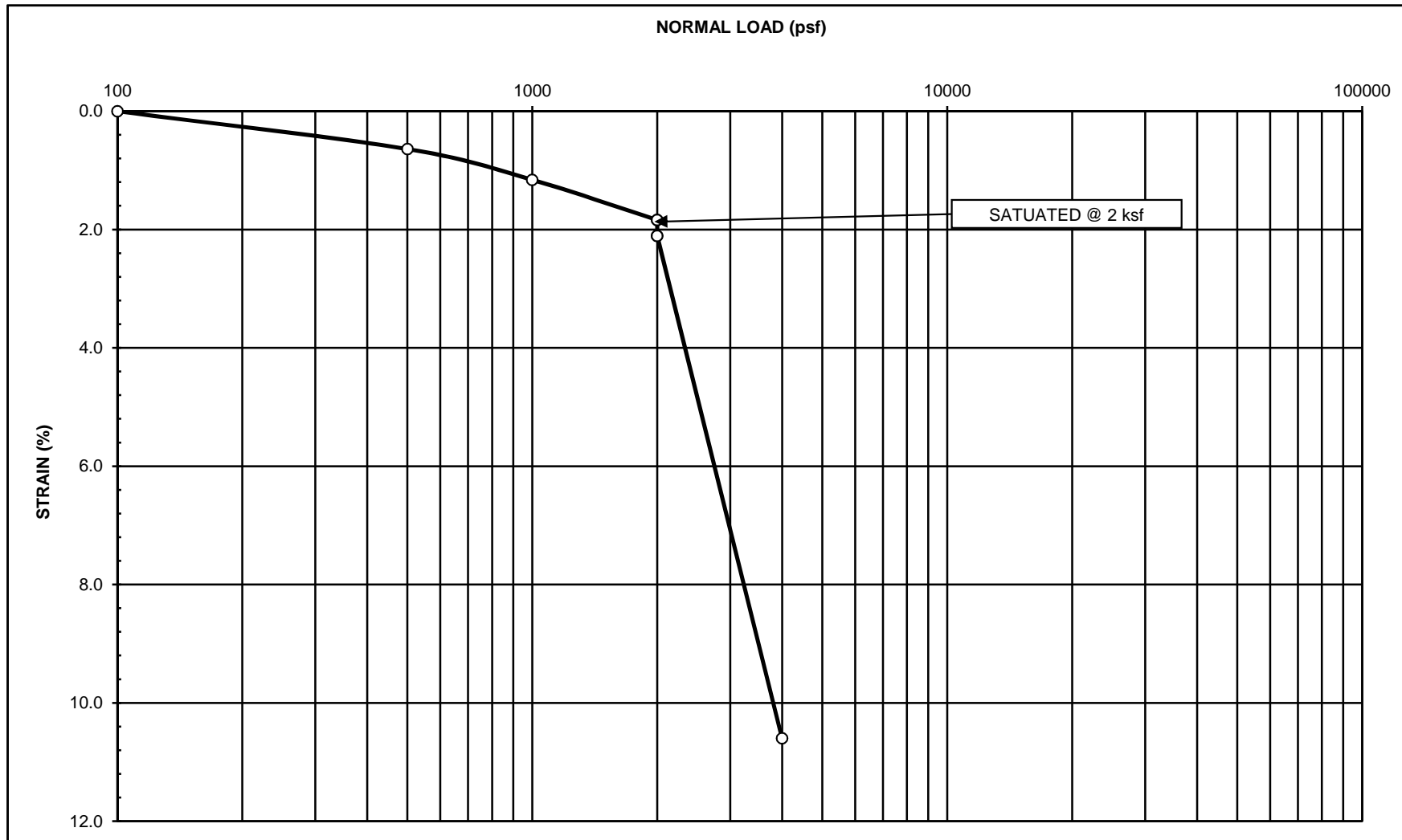
PROJECT:	HSR
TES NO.:	23502-ZS9
SAMPLE DATE.:	8/30/2013
BORING NO.:	S0019AR
SAMPLE NO.:	MC15-1 Depth(76.0'-76.5')
DESCRIPTION:	Silty Sand (SM)

Cohesive Pressure, psf	430
Internal Friction Angle $\phi$	37

SPECIMEN	A	B	C	D	E
DRY DENSITY (pcf)	87.1	87.1	87.1	---	---
INITIAL WATER CONTENT (%)	32.0	32.0	32.0	---	---
FINAL WATER CONTENT (%)	21.4	23.5	29.1	---	---
NORMAL STRESS (psf)	1415	3711	14384	---	---
MAXIMUM SHEAR (psf)	1074	3688	11058	---	---



  
**TECHNICON**  
 ENGINEERING SERVICES, INC.  
**COLLAPSE POTENTIAL TEST DATA**



BORING NO.	DEPTH (ft)	SAMPLE DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PROJECT:	HSR
					PROJECT NO.:	23502-ZS9
<b>S0019AR</b>	<b>26'-26.5'</b>	(SP) Poorly Graded Sand	14.6	92.0	TEST DATE:	9/12/2013
			FINAL	FINAL	TESTED BY:	K. Ford
			32.4	92.0	CONDITION:	Undisturbed